

permission to take a specimen was likely to have been very protracted.

Kannan cites three papers of mine and inclines to agree with the general tenor of them, which is to support collecting in strong terms and to seek greater rapprochement between the museum and conservation communities, but he misses the fact that I make specific provisos over possibly very rare new taxa and those liable to local extinction. This is a crucial area of concern which Kannan does not fully consider. It is not a question of museum scientists being 'bloodthirsty' (I worry that such vocabulary, even when used light-heartedly, risks polarising sensibilities on these issues). It is instead a matter of the appropriate use of the precautionary principle. I accept that the *liocichla* is likely to be commoner than we currently know, based on Athreya's experience, but we cannot be 100% certain of this. He was therefore in my view entirely correct, ethically and procedurally, to document and name the species without killing a specimen. As he stated, only when it is proved that

the species is commoner will it be appropriate to collect a series.

In his introductory paragraphs Kannan says that this case (1) 'may have added fuel to the already widespread feeling that museum collections are no longer necessary for describing new species' and, (2) 'worse, ... may actually make getting scientific collecting permits tougher'. He does not elaborate these points, but in any case I hope both are misapprehensions. First, Athreya took material and donated it to a museum, so (unlike the use of photographs as types in the *Science* paper) it can hardly be said that the case diminishes the need for museum collections. Second, there is no reason why such actions should exert any disruptive influence over the processes of permit issuance: collecting is licensed by bureaucrats according to laws and rules, not according to case history or precedent, so, unless a new law or rule is passed down by policy-makers, the *status quo* on permit issuance is unlikely to change.

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### 13. HEMIPTERAN FAUNA (INSECTA) INFESTING SANDAL *SANTALUM ALBUM* LINN. IN SOUTHERN INDIA<sup>1</sup>

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Order Hemiptera comprises of a large and diverse group of insects, varying considerably in body form, wings, antennae, life histories, and food habits. The mouthparts of Hemiptera are modified for piercing and sucking plant sap, but in some of the true bugs they are used for sucking blood. Many species are serious pests of cultivated crop plants and forest trees, some species inject toxic materials into the plant while feeding, while some transmit disease causing organisms, and a few Heteropterans are vectors of diseases

of warm-blooded vertebrates (Triplehorn and Johnson 2005). These pests damage plants by inserting their mouthparts into plant tissue and sucking juices. Heavily infested plants become yellow, wilted, deformed or stunted, and may eventually die. In the present study, surveys were conducted to document the Hemipteran fauna infesting Sandal plants in nurseries, plantations and natural forests from 2004 to 2006 in southern India; the findings are reported in this paper.

Table 1: Hemipteran fauna infesting Sandal in southern India

Family	Scientific name	Place of incidence
1. Aleyrodidae	<i>Aleurocanthus martini</i> David	Karnataka
	<i>Aleurodicus dispersus</i> Russell	Karnataka
	<i>Aleurolobus burlierensis</i> Jesudasan & David*	Karnataka
	<i>Dialeurodes icfreae</i> Sundararaj & Dubey	Tamil Nadu
2. Alydidae	<i>Leptocorisa acuta</i> Thunb.	Karnataka
	<i>Riptortus</i> sp.	Karnataka
3. Cercopidae	<i>Ptyelus</i> sp.	Karnataka
4. Cicadellidae	<i>Amritodus atkinsoni</i> (Leth.)	Karnataka
	<i>Batracomorphus brunomaculatus</i> (Evans)	Karnataka
	<i>Batracomorphus</i> sp.	Karnataka
	<i>Calodia kirkaldyi</i> Nielson	Karnataka, Kerala and Tamil Nadu
	<i>Cofana spectra</i> Dist.	Karnataka
	<i>C. unimaculatus</i> (Sign.)	Karnataka
	<i>Exitianus indicus</i> (Dist.)	Karnataka
	<i>Hecalus albomaculatus</i> (Dist.)	Kerala
	<i>Idioscopus clypealis</i> (Leth.)	Karnataka
	<i>I. nagpurensis</i> (Pruthi)	Karnataka
	<i>Kola paulula</i> (Walker)	Karnataka
	<i>Ledra mutica</i> Fabr.	Karnataka, Kerala and Tamil Nadu
	<i>Leofa truncata</i> Viraktamath and Viraktamath	Karnataka
	<i>Macropsis nigrolineata</i> Viraktamath	Karnataka
	<i>Mesargus albimaculata</i> (Dist.)	Karnataka
	<i>Neodartus acocepholoides</i> Melichar	Karnataka
	<i>Nephotettix virescens</i> (Dist.)	Karnataka
<i>Penthimia compacta</i> Walk.	Karnataka	
<i>Petaloccephala</i> sp.	Karnataka	
<i>P. nigrilinea</i> (Walk.)	Karnataka	
<i>Recilia dorsalis</i> (Motsch.)	Karnataka and Tamil Nadu	
5. Coccidae	<i>Cardiococcus bivalvata</i> (Green)	Karnataka
	<i>Ceroplastes actiniformis</i> Green	Karnataka, Kerala and Tamil Nadu
	<i>Ceroplastes ceriferus</i> (Fabricius)	Andhra Pradesh and Karnataka
	<i>Parasaissetia nigra</i> (Nietner)	Karnataka and Tamil Nadu
	<i>Saissetia coffeae</i> (Walker)	Andhra Pradesh, Karnataka, Kerala and Tamil Nadu
<i>Megapulvinaria maxima</i> (Green)	Karnataka	
6. Coreidae	<i>Cletomorpha</i> sp.	Karnataka
	<i>Homoeocerus</i> sp.	Karnataka
7. Delphacidae	<i>Nilaparvata lugens</i> (Stål)*	Karnataka and Tamil Nadu
	<i>Sogatella furcifera</i> (Horvath)*	Karnataka
8. Diaspididae	<i>Aonidiella orientalis</i> (Newstead)	Andhra Pradesh, Karnataka, Kerala and Tamil Nadu
	<i>Fiorinia fioriniae</i> Targioni Tozzetti	Karnataka
9. Eurybrachyidae	<i>Eurybrachis tomentosa</i> Fabr.	Andhra Pradesh, Karnataka, Kerala and Tamil Nadu
10. Kerridae	<i>Paratachardina lobata lobata</i> (Chamberlin)	Karnataka
	<i>Paratachardina silvestrii</i> (Mohdihassan)	Karnataka
11. Margarodidae	<i>Icerya aegyptiaca</i> (Douglas)	Karnataka
	<i>I. formicarum</i> Newstead	Karnataka
	<i>I. purchasi</i> Maskell	Karnataka
	<i>I. seychellarum</i> Westwood	Karnataka
	<i>Hemaspidoproctus cineris</i>	Karnataka
	<i>Perissopneumon phyllanthi</i> (Green)	Karnataka
12. Membracidae	<i>Leptocentrus longispinus</i> Dist.*	Karnataka
	<i>L. taurus</i> Fabr.	Karnataka and Kerala
	<i>Otinotus oneratus</i> Walk	Karnataka
	<i>Oxyrhachis tarandus</i> Fabr.	Andhra Pradesh, Karnataka, Kerala and Tamil Nadu
	<i>O. rufereus</i> *	Karnataka
	<i>Parayasa elegantula</i> Dist.*	Karnataka
13. Pentatomidae	<i>Canthecona furcellata</i> (Wolff)	Karnataka, Kerala and Tamil Nadu
	<i>Erthesina fullo</i> Thunb.	Karnataka and Tamil Nadu
	<i>Halyomorpha picus</i> (Fabr.)	Karnataka
	<i>Halys dentatus</i> Fabr.	Karnataka
	<i>Nezara viridula</i> (L.)	Karnataka
	<i>Paracritheus trimaculatus</i> (Le & Serr.)	Karnataka and Kerala
	<i>Plautia fimbriata</i> Fabr.	Karnataka, Kerala and Tamil Nadu

**Table 1:** Hemipteran fauna infesting Sandal in southern India (*contd.*)

Family	Scientific name	Place of incidence
14. Pseudococcidae	<i>Ferrisia virgata</i> (Cockerell)	Karnataka
	<i>Nipaecoccus filamentosus</i> (Cockerell)	Karnataka
	<i>Nipaecoccus viridis</i> (Newstead)	Karnataka
	<i>Pseudococcus longispinus</i> (Targioni Tozzetti)	Karnataka
	<i>Rastrococcus iceryoides</i> (Green)	Karnataka
15. Pyrrhocoridae	<i>Dysdercus</i> sp.	Karnataka, Kerala and Tamil Nadu
	<i>D. koenigii</i> Fabr.	Karnataka, Kerala and Tamil Nadu
16. Scutelleridae	<i>Chrysocoris</i> sp.	Karnataka
	<i>Scutellera</i> sp.	Karnataka and Tamil Nadu

\*New record on Sandal

The study revealed the presence of 72 species of Hemipterans from 16 families infesting Sandal in India (Table 1), which include 21 species of Cicadellidae followed by 7 species of Pentatomidae, 6 species each of Coccidae, Margarodidae and Membracidae, 5 species of Pseudococcidae, 4 species of Aleyrodidae, 2 species each of Alydidae, Coreidae, Delphacidae, Diaspididae, Kerridae, Pyrrhocoridae and Scutelleridae and one species each of Cercopidae and Eurybrachidae. Of these 6 species, namely *Aleurolobus burlierensis* Jesudasan and David (Aleyrodidae), *Nilaparvata lugens* (Stål) and *Sogatella furcifera* (Horvath) (Delphacidae) and *Leptocentrus longispinus* Dist., *Oxyrachis rufereus* and *Parayasa elegantula* Dist. (Membracidae) are new records. Earlier Mathur and Singh (1961) reported 17 species of Hemipterans and Varshney (1992, 2002) reported two species of scales and mealy bugs infesting Sandal. Remadevi *et al.* (2005) reported eight species of sucking pests, namely *Saissetia nigra* (Nietner), *Saissetia coffeae* (Walker), *Pulvinaria psidii* Maskell, *Pulvinaria maxima* Green, *Ceroplastes actiniformis* Green, *Inglisia bivalvata* (Green), *Tachardina lacca* Mahdihassan and *Aspidiotus* sp. infesting Sandal in nurseries. Sundararaj *et al.* (2006b) reported the occurrence of 23 species of scales and mealy bugs on Sandal, which include seven new records. In the present study though *Pulvinaria psidii* was found infesting Teak its infestation on Sandal was not observed, and hence the earlier report from Sandal needs confirmation. Sundararaj *et al.* (2006a) in their review indicated the presence of 411 species of Hemipterans under 43 families in Sandal

ecosystem, which included phytophagous insects, predators and casual visitors. The study revealed that less than 100 species of Hemipterans infest Sandal. Among the insect pests known to occur on Sandal the infestation by Hemiptera is deleterious as they affect the normal growth and reproduction of Sandal plants. With the emphasis on growing Sandal as an important plantation crop, along with relaxation of restrictions by the government for growing Sandal for commerce, there is rapid increase in the Sandal acreage in India. Therefore, holistic approach for better management of economically important sucking pests is very much required to increase the production of Sandalwood.

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## 14. NEW RECORD OF HAWKMOTH *SATASPES TAGALICA* F. *HAUXWELLII* (LEPIDOPTERA: SPHINGIDAE) FROM SANJAY GANDHI NATIONAL PARK, MUMBAI, INDIA<sup>1</sup>

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### Introduction

According to Bell and Scott (1937) and D' Abrera (1986), there are 1,354 species and subspecies of Hawkmoths in the world, of which 204 have been recorded from India. Rose *et al.* (2004) recorded 29 species from north-west India, and Sathe and Pandharbale (1999) recorded 13 species from western Maharashtra, including the Western Ghats. Shubhalaxmi and Chaturvedi (2004) has documented 32 species of Hawkmoths during her doctoral studies in the Sanjay Gandhi National Park (SGNP), Mumbai, Maharashtra, which is situated in the northern Western Ghats .

As a part of ongoing ecological study on Hawkmoths of SGNP, I reared a caterpillar of *Sataspes tagalica* f. *hauwellii* on *Dalbergia latifolia*. This is the first record of *Sataspes tagalica* f. *hauwellii* from India since the earlier record shows its distribution range to be from Myanmar to Sundaland and Philippines (D' Abrera 1986).

### Study area

Sanjay Gandhi National Park (SGNP) is situated in both Greater Bombay and Thane districts, with a total area of approximately 103 sq. km (19° 88'-19° 21' N; 72° 53'-72° 58' E). The Park lies to the west of the Western Ghats and flanks India's western seacoast. It has four types of habitats ranging from mangroves to the evergreen forests of the Western Ghats. The dominant vegetation type of this forest is mixed-deciduous, namely southern India moist-mixed deciduous forest. The Park is divided into two unequal parts; the southern block is more extensive while the northern Nagla block extends over just 16 sq. km. The southern block has a mixed forest, while the Nagla block is characterized by moist-evergreen forest.

### Species description

The adult has been identified based on the morphological characters mentioned and illustrated by Bell and Scott (1937), de Niceville (1900) and D' Abrera (1986). The caterpillar was obtained from Nagala block on July 11, 2005 and the adult was released, after photographing it, in the southern block near Goregaon on September 07, 2005.

According to Bell and Scott (1937) genus *Sataspes*

(Subfamily SpHINGINI) has three species: *Sataspes infernalis* (Westw.), *S. tagalica* Boisd. and *S. scotti* Jord. *S. tagalica* has four forms: *tagalica* Boisd., *thoracica* Roths. & Jord., *collaris* Roths. & Jord. and *hauwellii* de Niceville, of which only the former two are recorded from India. The species was first described by de Niceville (1900) from Taungoo, Upper Tenasserim, Myanmar. Tenasserim is a part of the southernmost division of lower Myanmar (9° 58'-19° 29' N; 95° 48'-99° 40' E) (Anon. 1908).

*Sataspes tagalica* f. *hauwellii* Boisd. 1875

*Sataspes hauwellii* de Nicev., 1900

*Sataspes tagalica* f. *hauwellii* Roths. & Jord., 1903

*Sataspes tagalica* *hauwellii* Seitz, 1929

**Adult:** The adult is a day flier and a beautiful mimic of the Carpenter Bee *Xylocopa auripennis*. Interestingly, the female moth mimics the male Carpenter Bee and vice versa. The description of the adult is given by de Niceville (1900). The adult *S. tagalica* f. *hauwellii* differed from the other three forms by the absence of yellow scales on the thorax and abdomen. The iridescence on wings of adults is seen only in live specimens (Ian Kitching pers. comm.).

**Early stages:** The early stages of this species have not been recorded, but the early stages of the closely allied *S. infernalis* have been mentioned by Bell and Scott (1937). The caterpillar and pupa are similar to *S. infernalis*.

The caterpillar was reared in captivity within the study area. Pupation occurred inside mud on July 29, 2005, and the adult emerged on September 06, 2005. The pupal period was 40 days, the maximum recorded for Hawkmoths in the monsoon season, so far.

**Larval food plant:** *Dalbergia latifolia* (Family Fabaceae)

**Distribution:** INDIA: Mumbai, Maharashtra; Myanmar to Sundaland, Philippines.

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